

# LW T6SG binning FK0PN0

## TOPLED®

TOPLED, SMT LED with integrated reflector. With our great experience in SMT LED we are able to offer a high quality product for all kind of applications.



## Applications

- Interior Illumination (e.g. Ambient Map)

## Features:

- Package: white PLCC-2 package, colored diffused silicone resin
- Chip technology: ThinGaN
- Typ. Radiation: 120° (Lambertian emitter)
- Color: Cx = 0.33, Cy = 0.33 acc. to CIE 1931 (• white)
- Corrosion Robustness Class: 1B
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)

## Ordering Information

Type	Luminous Intensity <sup>1)</sup> $I_F = 20 \text{ mA}$ $I_v$	Ordering Code
LW T6SG-V1BA-FK0PN0	710 ... 2240 mcd	Q65112A1382

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## Maximum Ratings

Parameter	Symbol		Values
Operating Temperature	$T_{op}$	min.	-40 °C
		max.	110 °C
Storage Temperature	$T_{stg}$	min.	-40 °C
		max.	110 °C
Junction Temperature	$T_j$	max.	125 °C
Forward Current $T_s = 25\text{ °C}$	$I_F$	min.	5 mA
		max.	50 mA
Surge Current $t \leq 10\ \mu\text{s}$ ; $D = 0.005$ ; $T_s = 25\text{ °C}$	$I_{FS}$	max.	300 mA
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)	$V_{ESD}$		2 kV
Reverse current <sup>2)</sup>	$I_R$	max.	20 mA

## Characteristics

$I_F = 20 \text{ mA}$ ;  $T_s = 25 \text{ °C}$

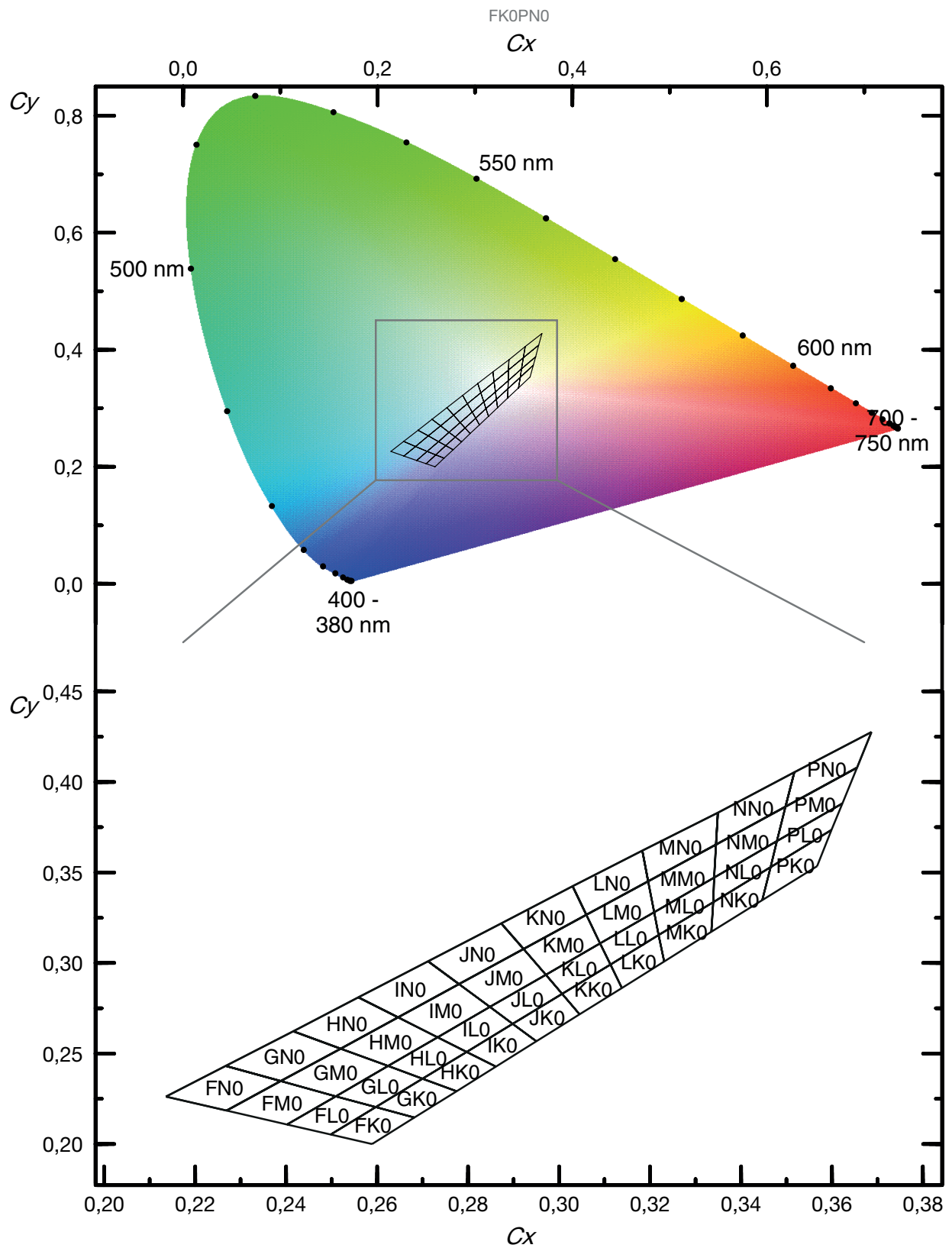
Parameter	Symbol		Values
Chromaticity Coordinate <sup>3)</sup>	$C_x$	typ.	0.33
	$C_y$	typ.	0.33
Viewing angle at 50 % $I_v$	$2\phi$	typ.	120 °
Forward Voltage <sup>4)</sup> $I_F = 20 \text{ mA}$	$V_F$	min.	2.90 V
		typ.	3.20 V
		max.	3.70 V
Reverse voltage <sup>2)</sup> $I_R = 1 \text{ mA}$	$V_R$	max.	2.3 V
Reverse voltage (ESD device)	$V_{R\text{ESD}}$	min.	12 V
Real thermal resistance junction/ambient <sup>5), 6)</sup>	$R_{\text{thJA real}}$	max.	340 K / W
Real thermal resistance junction/solderpoint <sup>5)</sup>	$R_{\text{thJS real}}$	max.	180 K / W

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## Brightness Groups

Group	Luminous Intensity <sup>1)</sup> $I_F = 20 \text{ mA}$ min. $I_v$	Luminous Intensity <sup>1)</sup> $I_F = 20 \text{ mA}$ max. $I_v$	Luminous Flux <sup>7)</sup> $I_F = 20 \text{ mA}$ typ. $\Phi_v$
V1	710 mcd	900 mcd	2415 mlm
V2	900 mcd	1120 mcd	3030 mlm
AA	1120 mcd	1400 mcd	3780 mlm
AB	1400 mcd	1800 mcd	4800 mlm
BA	1800 mcd	2240 mcd	6060 mlm

## Chromaticity Coordinate Groups



**Color Chromaticity Groups** <sup>3)</sup>

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
FK0	0.2597	0.2204	HK0	0.2775	0.2292	JK0	0.2950	0.2568
	0.2498	0.2053		0.2861	0.2427		0.3045	0.2717
	0.2682	0.2146		0.2797	0.2509		0.3007	0.2830
	0.2589	0.2000		0.2700	0.2361		0.2898	0.2664
FL0	0.2402	0.2108	HL0	0.2700	0.2361	JL0	0.2898	0.2664
	0.2498	0.2053		0.2624	0.2431		0.2848	0.2757
	0.2509	0.2264		0.2797	0.2509		0.3007	0.2830
	0.2597	0.2204		0.2733	0.2590		0.2971	0.2935
FM0	0.2402	0.2108	HM0	0.2624	0.2431	JM0	0.2971	0.2935
	0.2388	0.2348		0.2733	0.2590		0.2922	0.3077
	0.2509	0.2264		0.2646	0.2700		0.2848	0.2757
	0.2269	0.2185		0.2520	0.2527		0.2780	0.2883
FN0	0.2388	0.2348	HN0	0.2520	0.2527	JN0	0.2780	0.2883
	0.2269	0.2185		0.2416	0.2623		0.2712	0.3009
	0.2267	0.2432		0.2646	0.2700		0.2922	0.3077
	0.2136	0.2262		0.2559	0.2810		0.2873	0.3219
GK0	0.2597	0.2204	IK0	0.2861	0.2427	KK0	0.3113	0.2992
	0.2682	0.2146		0.2898	0.2664		0.3138	0.2862
	0.2700	0.2361		0.2950	0.2568		0.3007	0.2830
	0.2775	0.2292		0.2797	0.2509		0.3045	0.2717
GL0	0.2509	0.2264	ILO	0.2797	0.2509	KL0	0.2971	0.2935
	0.2597	0.2204		0.2733	0.2590		0.3007	0.2830
	0.2624	0.2431		0.2898	0.2664		0.3090	0.3108
	0.2700	0.2361		0.2848	0.2757		0.3113	0.2992
GM0	0.2624	0.2431	IM0	0.2733	0.2590	KM0	0.2971	0.2935
	0.2509	0.2264		0.2848	0.2757		0.2922	0.3077
	0.2388	0.2348		0.2780	0.2883		0.3090	0.3108
	0.2520	0.2527		0.2646	0.2700		0.3060	0.3266
GN0	0.2416	0.2623	IN0	0.2646	0.2700	KN0	0.3030	0.3424
	0.2267	0.2432		0.2559	0.2810		0.2873	0.3219
	0.2520	0.2527		0.2780	0.2883		0.3060	0.3266
	0.2388	0.2348		0.2712	0.3009		0.2922	0.3077

LW T6SG binning FK0PN0

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
LK0	0.3113	0.2992	MM0	0.3341	0.3472	PK0	0.3447	0.3347
	0.3138	0.2862		0.3345	0.3654		0.3465	0.3530
	0.3219	0.3154		0.3196	0.3451		0.3567	0.3535
	0.3231	0.3008		0.3209	0.3281		0.3599	0.3735
LLO	0.3090	0.3108	MNO	0.3349	0.3830	PLO	0.3465	0.3530
	0.3113	0.2992		0.3183	0.3621		0.3479	0.3673
	0.3209	0.3281		0.3345	0.3654		0.3623	0.3882
	0.3219	0.3154		0.3196	0.3451		0.3599	0.3735
LMO	0.3196	0.3451	NKO	0.3465	0.3530	PM0	0.3479	0.3673
	0.3060	0.3266		0.3339	0.3336		0.3498	0.3863
	0.3209	0.3281		0.3447	0.3347		0.3655	0.4079
	0.3090	0.3108		0.3335	0.3172		0.3623	0.3882
LNO	0.3030	0.3424	NLO	0.3341	0.3472	PNO	0.3655	0.4079
	0.3060	0.3266		0.3339	0.3336		0.3498	0.3863
	0.3183	0.3621		0.3479	0.3673		0.3687	0.4276
	0.3196	0.3451		0.3465	0.3530		0.3517	0.4053
MK0	0.3339	0.3336	NMO	0.3345	0.3654			
	0.3219	0.3154		0.3341	0.3472			
	0.3335	0.3172		0.3498	0.3863			
	0.3231	0.3008		0.3479	0.3673			
MLO	0.3209	0.3281	NNO	0.3517	0.4053			
	0.3219	0.3154		0.3349	0.3830			
	0.3341	0.3472		0.3498	0.3863			
	0.3339	0.3336		0.3345	0.3654			



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## Group Name on Label

**Example: AA-FK0**

Brightness

Color Chromaticity

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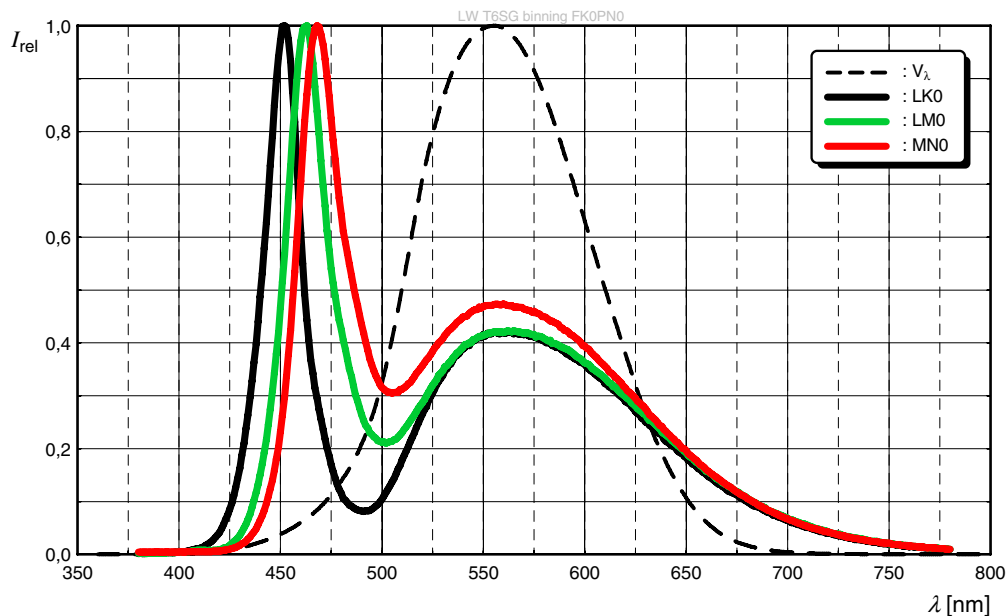
AA

FK0

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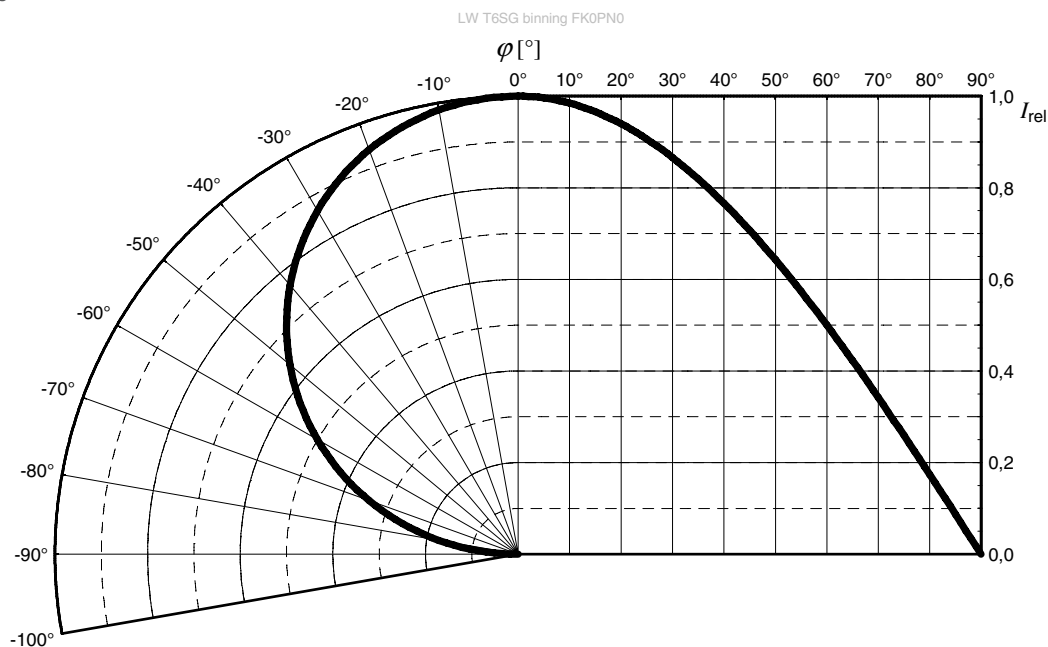
### Relative Spectral Emission <sup>7)</sup>

$I_{rel} = f(\lambda); I_F = 20 \text{ mA}; T_S = 25 \text{ }^\circ\text{C}$



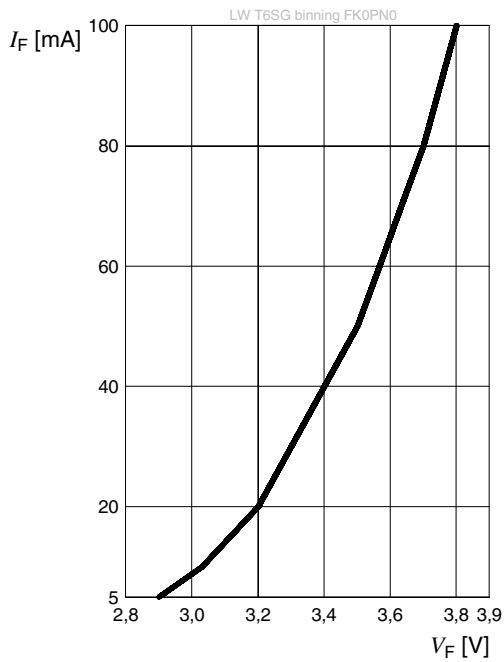
### Radiation Characteristics <sup>7)</sup>

$I_{rel} = f(\phi); T_S = 25 \text{ }^\circ\text{C}$



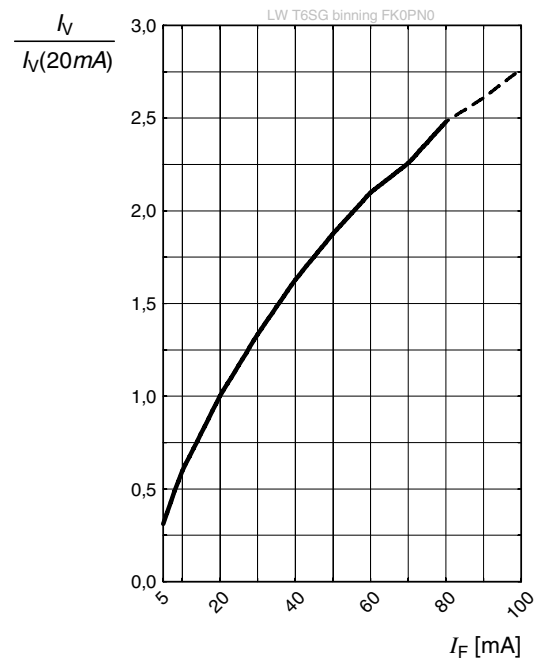
### Forward current <sup>7)</sup>

$$I_F = f(V_F); T_S = 25 \text{ }^\circ\text{C}$$



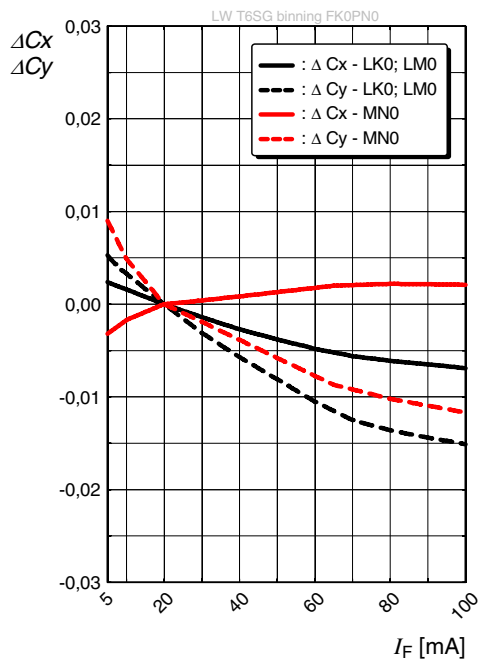
### Relative Luminous Intensity <sup>7), 8)</sup>

$$I_V/I_V(20 \text{ mA}) = f(I_F); T_S = 25 \text{ }^\circ\text{C}$$



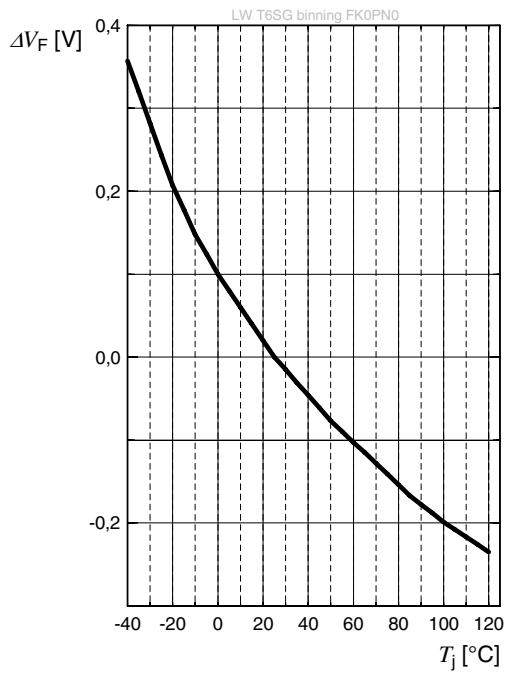
### Chromaticity Coordinate Shift <sup>7)</sup>

$$\Delta C_x, \Delta C_y = f(I_F); T_S = 25 \text{ }^\circ\text{C}$$



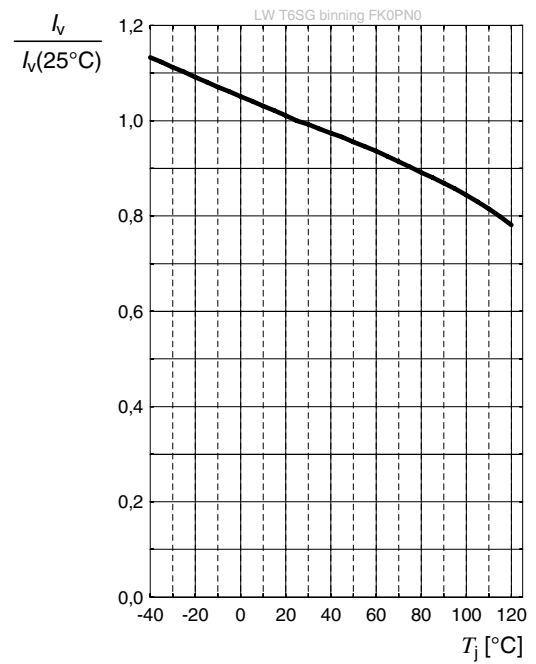
### Forward Voltage <sup>7)</sup>

$$\Delta V_F = V_F - V_F(25^\circ\text{C}) = f(T_j); I_F = 20\text{ mA}$$



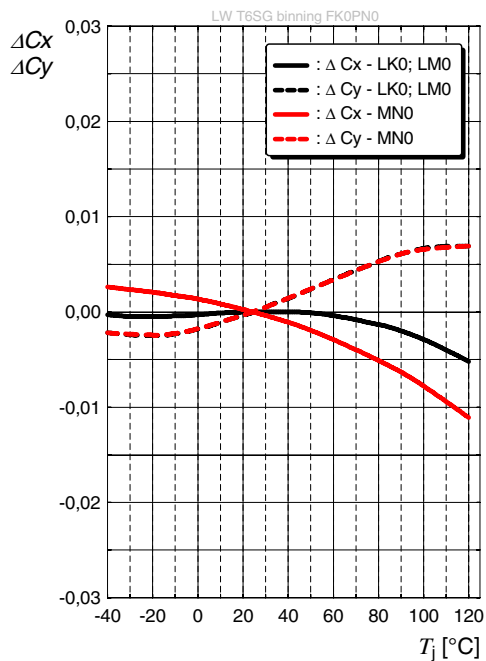
### Relative Luminous Intensity <sup>7)</sup>

$$I_V/I_V(25^\circ\text{C}) = f(T_j); I_F = 20\text{ mA}$$



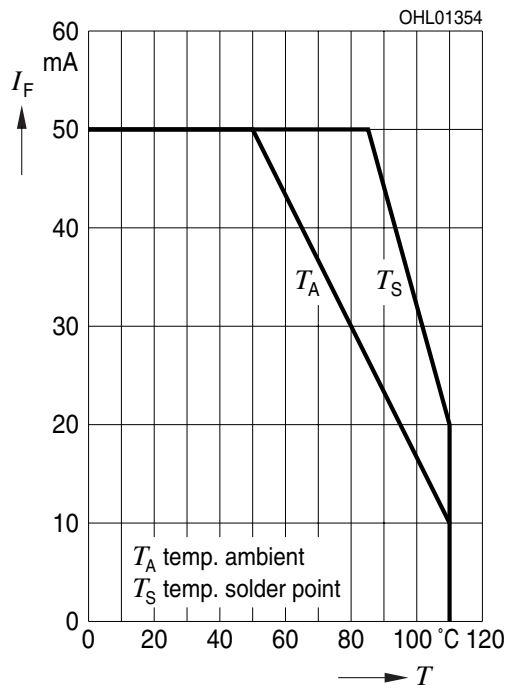
### Chromaticity Coordinate Shift <sup>7)</sup>

$$\Delta C_x, \Delta C_y = f(T_j); I_F = 20\text{ mA}$$



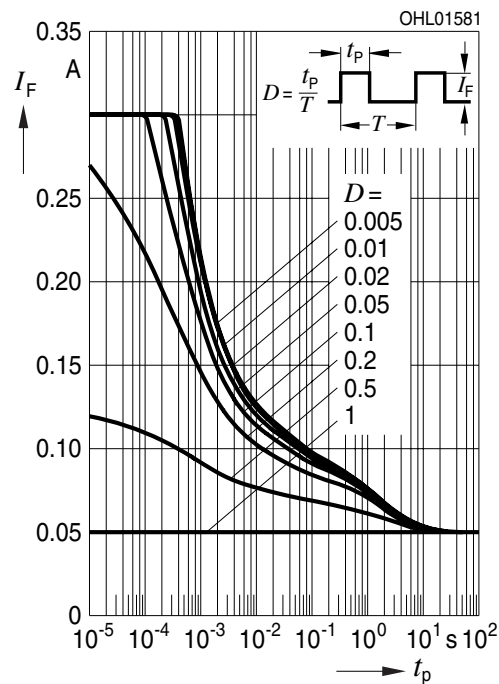
### Max. Permissible Forward Current

$I_F = f(T)$



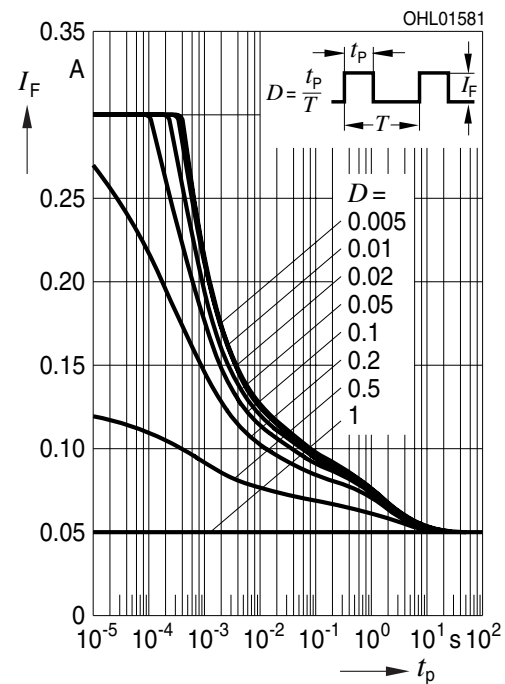
### Permissible Pulse Handling Capability

$I_F = f(t_p)$ ; D: Duty cycle;  $T_S = 25\text{ °C}$

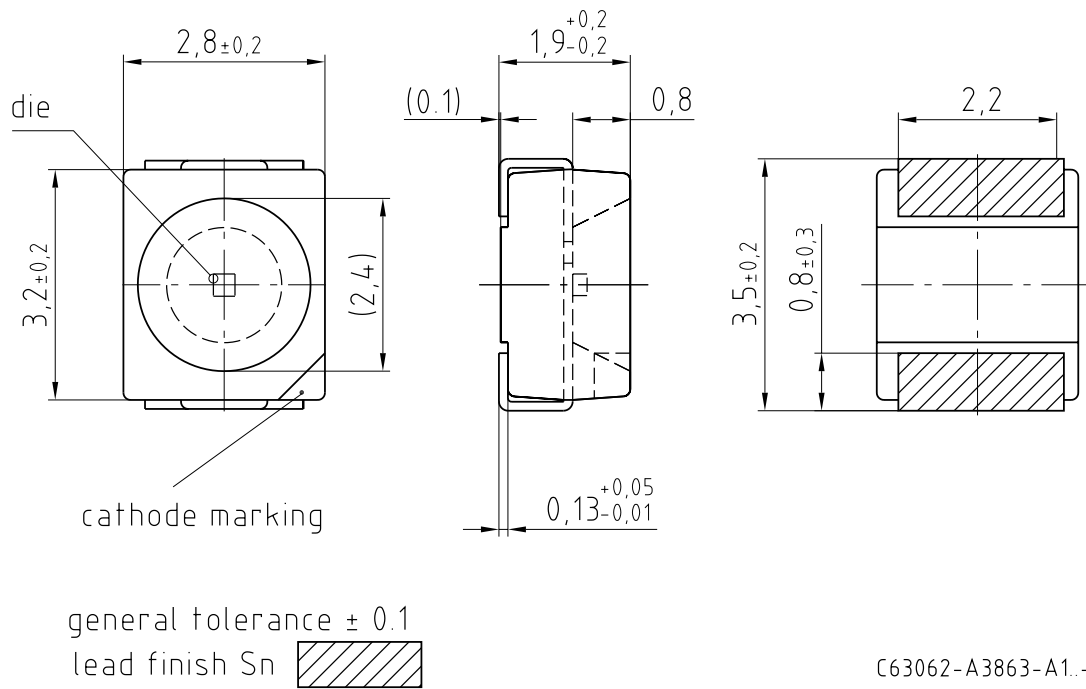


### Permissible Pulse Handling Capability

$I_F = f(t_p)$ ; D: Duty cycle;  $T_S = 85\text{ °C}$



**Dimensional Drawing** <sup>9)</sup>

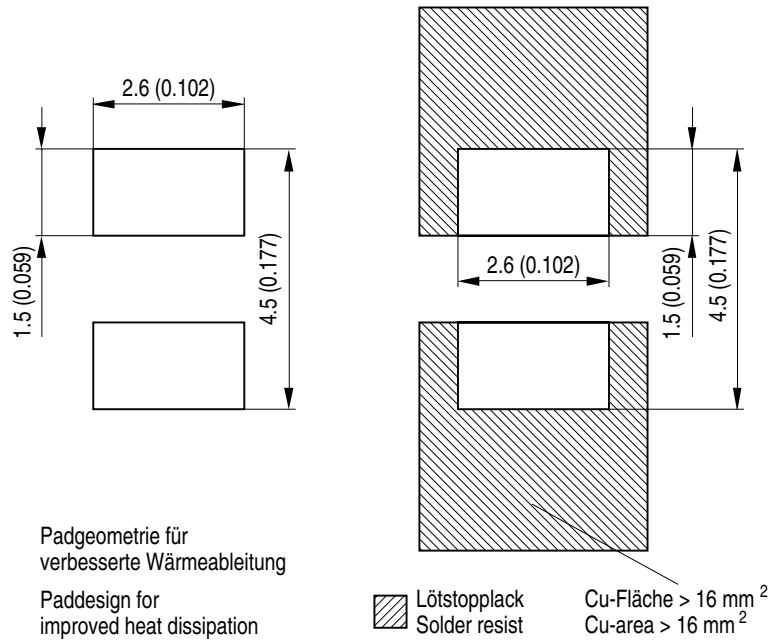


**Approximate Weight:** 34.0 mg

**Corrosion test:** Class: 1B  
Test condition: 25°C / 75 % RH / 200ppb SO<sub>2</sub>, 200ppb NO<sub>2</sub>, 10ppb H<sub>2</sub>S, 10ppb Cl<sub>2</sub> / 21 days (EN 60068-2-60 (Method 4))

**ESD advice:** The device is protected by ESD device which is connected in parallel to the Chip.

**Recommended Solder Pad** <sup>9)</sup>

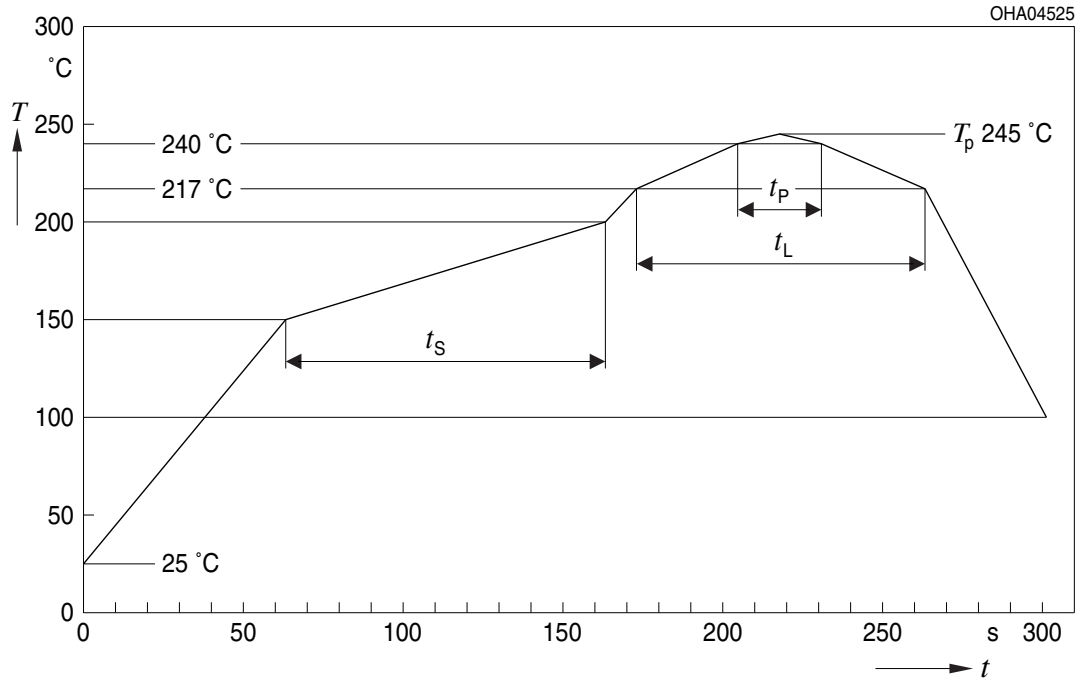


OHLPY970

For superior solder joint connectivity results we recommend soldering under standard nitrogen atmosphere. Package not suitable for ultra sonic cleaning.

## Reflow Soldering Profile

Product complies to MSL Level 2 acc. to JEDEC J-STD-020E

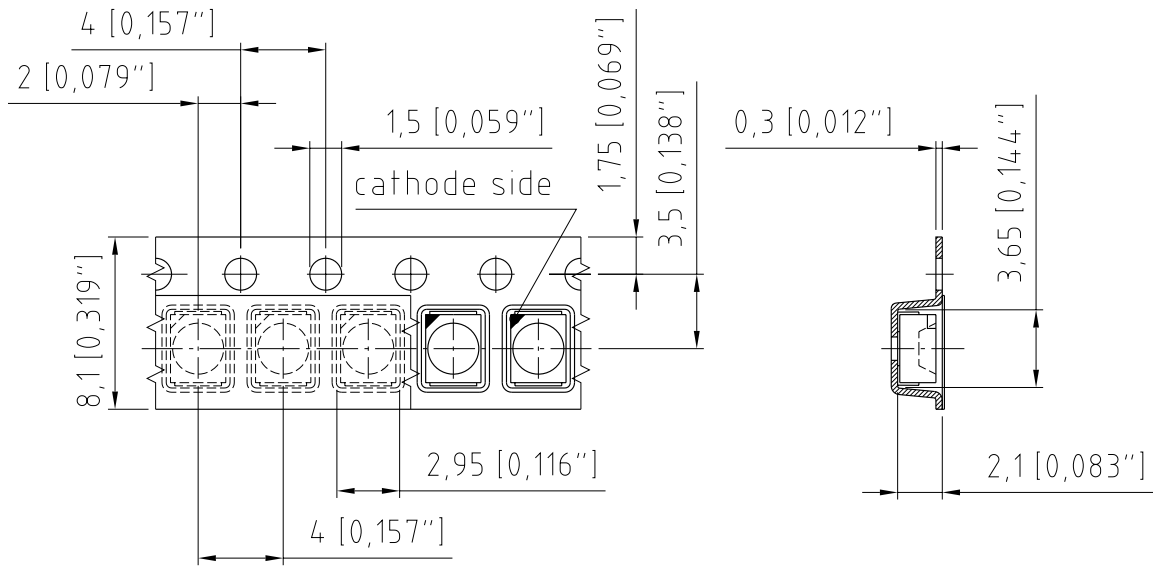


Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat*) 25 °C to 150 °C			2	3	K/s
Time $t_s$ $T_{Smin}$ to $T_{Smax}$	$t_s$	60	100	120	s
Ramp-up rate to peak*) $T_{Smax}$ to $T_p$			2	3	K/s
Liquidus temperature	$T_L$		217		°C
Time above liquidus temperature	$t_L$		80	100	s
Peak temperature	$T_p$		245	260	°C
Time within 5 °C of the specified peak temperature $T_p - 5$ K	$t_p$	10	20	30	s
Ramp-down rate* $T_p$ to 100 °C			3	6	K/s
Time 25 °C to $T_p$				480	s

All temperatures refer to the center of the package, measured on the top of the component  
 \*) slope calculation  $DT/Dt$ :  $Dt$  max. 5 s; fulfillment for the whole T-range

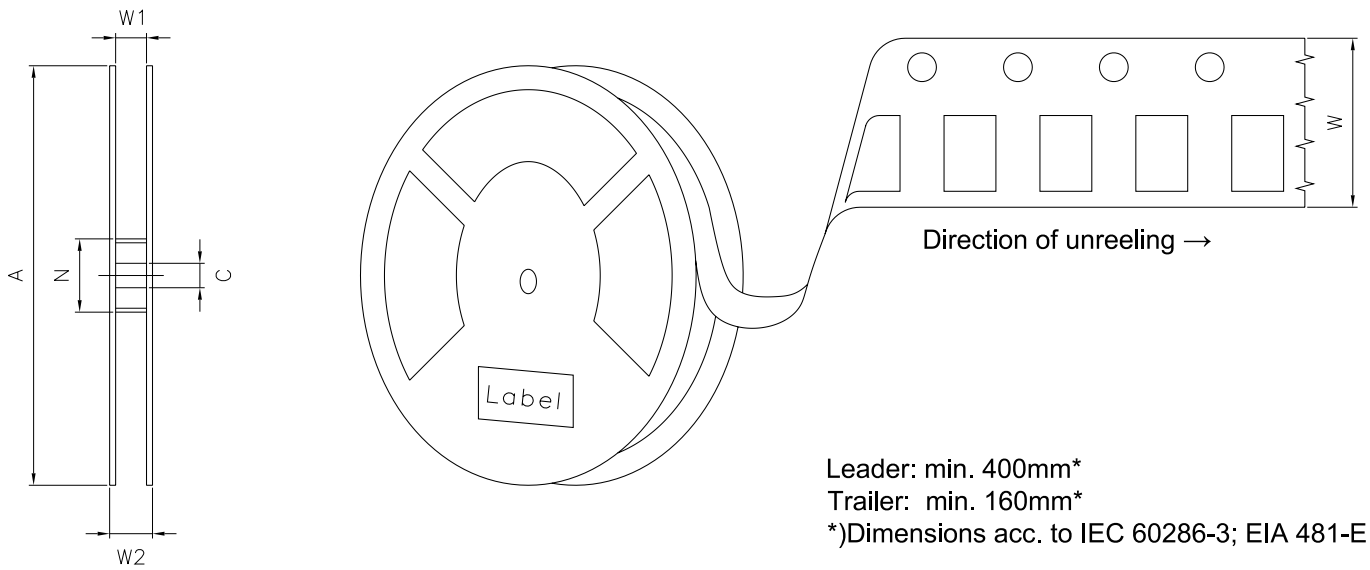


**Taping** <sup>9)</sup>



C63062-A3863-B3 -02

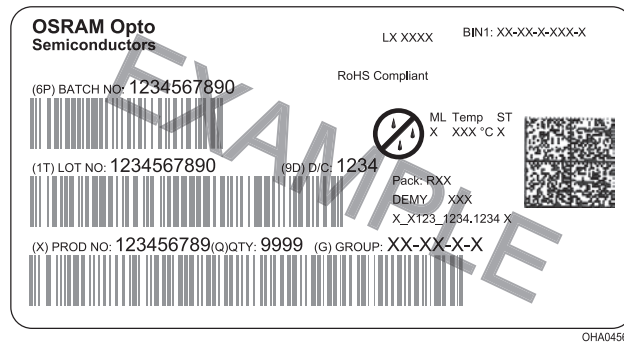
**Tape and Reel** <sup>10)</sup>



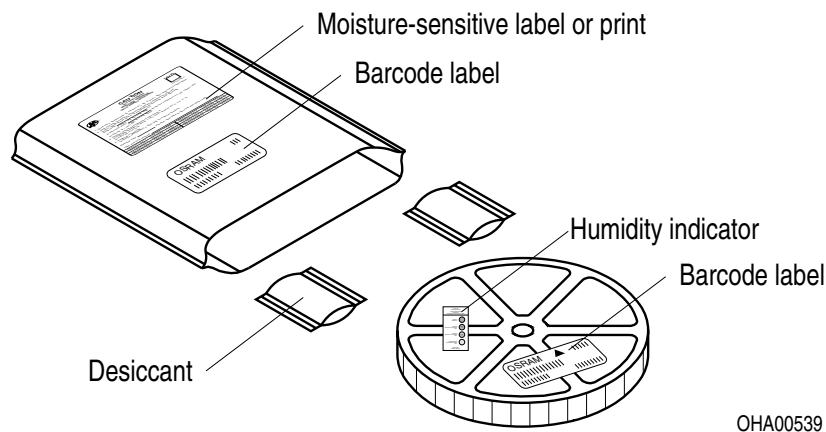
**Reel dimensions [mm]**

A	W	N <sub>min</sub>	W <sub>1</sub>	W <sub>2 max</sub>	Pieces per PU
180 mm	8 + 0.3 / - 0.1	60	8.4 + 2	14.4	2000
330 mm	8 + 0.3 / - 0.1	60	8.4 + 2	14.4	8000

## Barcode-Product-Label (BPL)

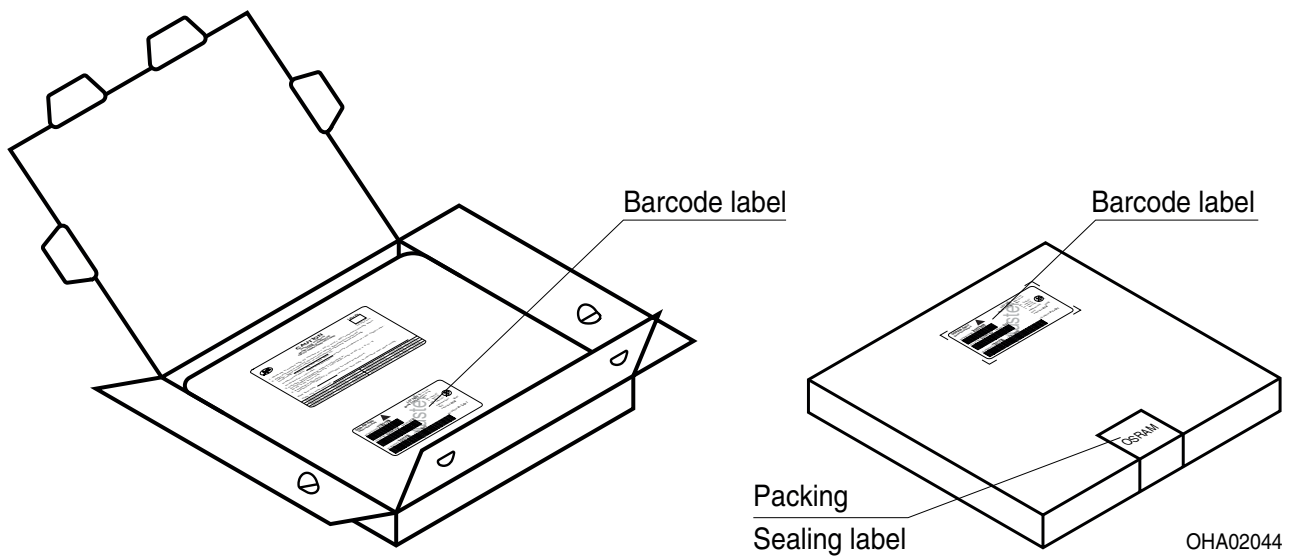


## Dry Packing Process and Materials <sup>9)</sup>



Moisture-sensitive product is packed in a dry bag containing desiccant and a humidity card according JEDEC-STD-033.

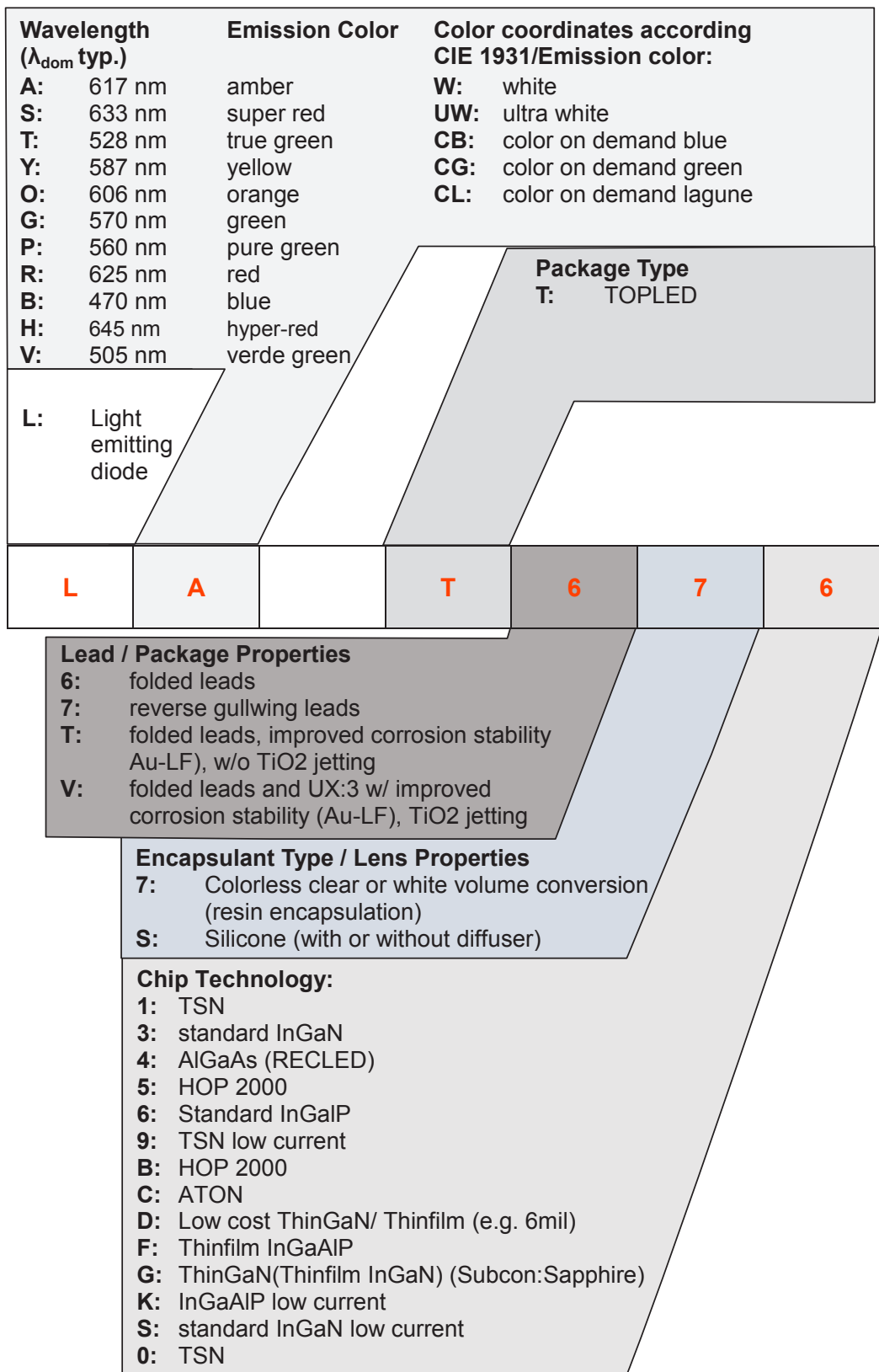
## Transportation Packing and Materials <sup>9)</sup>



### Dimensions of transportation box in mm

Width	Length	Height
200 ± 5 mm	195 ± 5 mm	30 ± 5 mm
352 ± 5 mm	352 ± 5 mm	33 ± 5 mm

### Type Designation System



## Notes

The evaluation of eye safety occurs according to the standard IEC 62471:2006 (photo biological safety of lamps and lamp systems). Within the risk grouping system of this IEC standard, the device specified in this data sheet falls into the class **exempt group (exposure time 10000 s)**. Under real circumstances (for exposure time, conditions of the eye pupils, observation distance), it is assumed that no endangerment to the eye exists from these devices. As a matter of principle, however, it should be mentioned that intense light sources have a high secondary exposure potential due to their blinding effect. When looking at bright light sources (e.g. headlights), temporary reduction in visual acuity and afterimages can occur, leading to irritation, annoyance, visual impairment, and even accidents, depending on the situation.

Subcomponents of this LED contain, in addition to other substances, metal filled materials including silver. Metal filled materials can be affected by environments that contain traces of aggressive substances. Therefore, we recommend that customers minimize LED exposure to aggressive substances during storage, production, and use. LEDs that showed visible discoloration when tested using the described tests above did show no performance deviations within failure limits during the stated test duration. Respective failure limits are described in the IEC60810.

For further application related informations please visit [www.osram-os.com/appnotes](http://www.osram-os.com/appnotes)

## Disclaimer

### Disclaimer

Language english will prevail in case of any discrepancies or deviations between the two language wordings.

### Attention please!

The information describes the type of component and shall not be considered as assured characteristics. Terms of delivery and rights to change design reserved. Due to technical requirements components may contain dangerous substances.

For information on the types in question please contact our Sales Organization.

If printed or downloaded, please find the latest version on the OSRAM OS website.

### Packing

Please use the recycling operators known to you. We can also help you – get in touch with your nearest sales office.

By agreement we will take packing material back, if it is sorted. You must bear the costs of transport. For packing material that is returned to us unsorted or which we are not obliged to accept, we shall have to invoice you for any costs incurred.

### Product safety devices/applications or medical devices/applications

OSRAM OS components are not developed, constructed or tested for the application as safety relevant component or for the application in medical devices.

In case Buyer – or Customer supplied by Buyer– considers using OSRAM OS components in product safety devices/applications or medical devices/applications, Buyer and/or Customer has to inform the local sales partner of OSRAM OS immediately and OSRAM OS and Buyer and /or Customer will analyze and coordinate the customer-specific request between OSRAM OS and Buyer and/or Customer.

## Glossary

- 1) **Brightness:** Brightness values are measured during a current pulse of typically 25 ms, with an internal reproducibility of  $\pm 8\%$  and an expanded uncertainty of  $\pm 11\%$  (acc. to GUM with a coverage factor of  $k = 3$ ).
- 2) **Reverse Operation:** Reverse Operation of 10 hours is permissible in total. Continuous reverse operation is not allowed. ESD device will show visible radiation (emission color red) during reverse operation of the device.
- 3) **Chromaticity coordinate groups:** Chromaticity coordinates are measured during a current pulse of typically 25 ms, with an internal reproducibility of  $\pm 0.005$  and an expanded uncertainty of  $\pm 0.01$  (acc. to GUM with a coverage factor of  $k = 3$ ).
- 4) **Forward Voltage:** The forward voltage is measured during a current pulse of typically 8 ms, with an internal reproducibility of  $\pm 0.05\text{ V}$  and an expanded uncertainty of  $\pm 0.1\text{ V}$  (acc. to GUM with a coverage factor of  $k = 3$ ).
- 5) **Thermal Resistance:**  $R_{th\ max}$  is based on statistical values ( $6\sigma$ ).
- 6) **Thermal Resistance:**  $R_{thJA}$  results from mounting on PC board FR 4 (pad size  $16\text{ mm}^2$  per pad)
- 7) **Typical Values:** Due to the special conditions of the manufacturing processes of semiconductor devices, the typical data or calculated correlations of technical parameters can only reflect statistical figures. These do not necessarily correspond to the actual parameters of each single product, which could differ from the typical data and calculated correlations or the typical characteristic line. If requested, e.g. because of technical improvements, these typ. data will be changed without any further notice.
- 8) **Characteristic curve:** In the range where the line of the graph is broken, you must expect higher differences between single devices within one packing unit.
- 9) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with  $\pm 0.1$  and dimensions are specified in mm.
- 10) **Tape and Reel:** All dimensions and tolerances are specified acc. IEC 60286-3 and specified in mm.



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